

NOV 27 1995



22 November 1995

Mr. Ken Cota  
Cota's Deli and Beverage  
RFD #4, Box 1390  
Enosburg, VT 05450

Subject: Initial Site Investigation Report  
Corrective-Action Feasibility Investigation Work Plan/Cost Estimate  
Cota's Deli and Beverage, Montgomery, Vermont (VT DEC Site 88-0230).

Dear Mr. Cota:

Please find enclosed copies of the above-referenced documents. As we discussed by telephone earlier today, I am forwarding copies of these documents to Matt Moran of the VT DEC.

Ground Water of Vermont appreciates the opportunity to perform this investigation for you, and we look forward to continuing to assist you at this site. Please give me a call at any time if you have any questions or comments

Sincerely,

Ron Miller  
Hydrogeologist and Regional Manager

Enclosures

cc: Matt Moran, VT DEC  
Ref: 95058L01.SAM.

**INITIAL SITE INVESTIGATION REPORT**

**Cota's Deli and Beverage**

**VT DEC Site #88-0230**

**22 November 1995**

Prepared for:

**Cota's Deli and Beverage**

**RFD #4, Box 1390**

**Enosburg, VT 05450**

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**GWV Project #V95-058**

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## **EXECUTIVE SUMMARY**

Ground Water of Vermont (GWV) conducted an initial site investigation at Cota's Deli And Beverage (formerly E.J.'s Mini Mart) in Montgomery, Vermont during October 1995. The principal investigation findings are summarized as follows:

1. Gasoline has been released to the subsurface in the vicinity of two former gasoline underground storage tanks (USTs) and a pump island at the site. A piping leak near the pump island was reportedly discovered and repaired in 1988. When the USTs were removed in October 1995, a quarter-inch-diameter hole was discovered in one of the USTs, and deep pits and extensive soil contamination were observed beneath the other UST.
2. The gasoline releases have impacted the sand-and-gravel soils in the vicinity of the releases. Photoionization detector (PID) readings on soils beneath the USTs and the pump island exceeded 2,000 parts per million (ppm). Soil-gas results suggest that the soil-contaminant plume covers approximately 3,500 square feet.
3. The gasoline releases have impacted ground water in the sand-and-gravel aquifer downgradient of the releases. Gasoline compound concentrations in ground-water samples collected from three monitoring wells downgradient of the release areas exceeded one or more Vermont water-quality standards. The highest concentrations were observed in monitoring well MW-5, located downgradient of the former pump island.
4. The gasoline releases have also impacted the nearby Trout River. Gasoline odors, sheens, and/or evidence of increased biological activity have been observed periodically since 1988 along the north bank of the Trout River at a seep approximately 120 feet south of the former USTs and pump island. Benzene concentrations in surface-water samples collected from the seep in 1988, 1994, and 1995 exceeded Vermont water-quality standards.
5. During the 5 October 1995 monitoring event, the water table beneath the site was observed at depths of nine to ten feet. Ground water in the surficial aquifer was flowing southwesterly at an average gradient of 3.2 percent. Reported bedrock depths at the site range from seven to twelve feet.
6. Unless corrective action is taken, gasoline in soils beneath the release locations will likely continue to leach into ground water and seep into the Trout River for several years.

On the basis of these findings, GWV makes the following recommendations:

1. Corrective action should be undertaken to remediate soil contamination in the source area. Given the coarse nature of soils at the site and the thin saturated thickness above bedrock, the most cost-effective remedial method appears to be soil vapor extraction.
2. The potential effectiveness of soil vapor extraction should be evaluated by conducting a pilot study. Pilot study results should be used to develop a Corrective Action Plan for the site.
3. Surface-water and ground-water quality at the site should be monitored monthly.

## **1.0 INTRODUCTION**

This report details the results of a site investigation at Cota's Deli and Beverage (formerly E.J.'s Mini-Mart) in Montgomery, Vermont. The report has been prepared by Ground Water of Vermont (GWV) for Mr. Kenneth Cota of Enosburg, Vermont.

The site investigation has been conducted in accordance with the Expressway process of the Vermont Department of Environmental Conservation (VT DEC).

### **1.1 Site Location and Physical Setting**

The site is located in the Town of Montgomery, Vermont. The property is located on the south side of Comstock Bridge Road, approximately 50 feet south of its intersection with Vermont Route 118 (see Figure 1, Site Location Map). The area surrounding the site is predominantly residential in nature. The site is bounded to the north by Comstock Bridge Road, to the east by a residence, to the west by a drainage ditch, and to the south by the Trout River.

The Town of Montgomery is located in the Trout River valley. The Trout River flows generally northwest through the valley before discharging into the Lamoille River approximately 10 miles northwest of the site.

The site is located on a flat area adjacent to the north bank of the river. Surficial materials at the site are mapped as recent alluvium, or stream sediments (Stewart and MacClintock, 1970). Bedrock underlying the site is mapped as the Underhill Formation, which is a metamorphic schist of Cambrian age (Doll, 1961).

Soils encountered in the two borings installed at the site by hollow-stem-auger methods (MW-1 and MW-2) were variously described as "silty sand," "sandy silt" and "fine brown silt," underlain at depths of six to seven feet by coarse sand, gravel and cobbles. Where reported, bedrock depths were between eight and nine feet.

During the October 1995 UST removals, soils encountered in the excavation consisted of sand and gravel with a trace of cobbles. Bedrock was encountered at a depth of nine feet below ground surface.

### **1.2 Site History**

The property has reportedly been used as an automotive service station for many years and has had several owners. The property has been owned by Kenneth Cota of Enosburg, Vermont since early 1995.

The site and surrounding buildings are served by a private water-supply system. Municipal sewer service is not available.

The business at the site was known as E.J.'s Mini-Mart under the previous owners, Edward and Joan Shupe, who reportedly owned the property from approximately 1986 through 1994. From the 1930s through 1986, the site was reportedly owned by members of the St. Onge family, who operated an automotive service station on the property.

The most recent generation of underground storage tanks (USTs) at the site consisted of two 2,000-gallon single-walled-steel gasoline tanks, which were reportedly installed in approximately 1977. The USTs and associated piping systems were removed and replaced with a compartmented, 5,000-gallon, double-walled-steel UST system in October 1995. GWV performed an assessment of the UST removal in accordance with Vermont regulations, and reported its findings and recommendations to the VT DEC in a letter report dated 31 October 1995.

The history of activities related to petroleum releases at the site is summarized below. Information contained in this summary was obtained from VT DEC records and from a Phase II Environmental Site Assessment conducted by ATC Environmental, Inc.

- *7 June 1988.* The VT DEC Water Resources Division receives an anonymous call reporting a "gasoline odor and oil seeping into the Trout River behind E.J.'s Mini-Mart." The investigating official reportedly concludes that the source of the seep was material dumped on the site in the past.
- *20 July 1988.* The VT DEC Spill Program receives a report of a sheen and odor of petroleum at the same location. The investigating official, Mike Nelson, identifies two oily plumes, but does not determine the source or extent of the contamination.
- *19 October 1988.* The VT DEC collects samples of surface water at three locations in the Trout River near the site. No record of sample locations was identified in the VT DEC file. Analytical results (see Section 2.4) indicated the presence of regulated gasoline compounds at levels above Vermont drinking water standards.
- *25 October 1988.* The VT DEC installs a sandbag containment system along the points of petroleum discharge to the Trout River. Three to four absorbent pads become saturated on the first day, and the owner agrees to maintain the collection system.
- *25 - 27 October 1988.* The VT DEC supervises the installation of six monitoring wells at the site. Petroleum vapors are detected in five of the wells. The monitoring well located near the pump island (MW-5) is observed to contain the highest levels of contamination.
- *27 October 1988.* A leak in the product piping is identified and repaired. According to a file memo prepared by Chuck Schwer of the VT DEC, approximately one quart of gasoline was being released after each use of the pump.
- *2 November 1988 - 30 September 1990.* The six on-site monitoring wells are checked for free-phase petroleum product weekly. Free product is detected at various times in monitoring wells MW-3, MW-4, and MW-5. The greatest product thickness is 1.5 inches, measured on 13 November 1988 in monitoring well MW-3. Product thicknesses generally decrease over time; no product is detected in any of the on-site wells between 30 September 1989 and the final recorded monitoring on 30 September 1990.
- *October 1990.* The VT DEC places the site on the Inactive Hazardous Waste Sites List.

- *October 1994.* ATC Environmental conducts a Phase I Environmental Site Assessment of the property for the Howard Bank (this report has not been made public)
- *10 November 1994.* As part of a Phase II Environmental Site Assessment of the property, ATC Environmental collects ground-water samples from three on-site monitoring wells and a surface-water sample from a petroleum seep in the Trout River. Analytical results (see Sections 2.3 and 2.4) indicate that ground water and surface water exceed Vermont water-quality standards for one or more gasoline compounds.
- *13 December 1994.* ATC submits the Phase II report to the VT DEC.
- *January 1995.* The VT DEC places the site back on the Active Hazardous Waste Sites List.
- *14 August 1995.* The VT DEC requests that the new site owner, Kenneth Cota, retain an environmental consultant to further evaluate contamination at the site.
- *2 October 1995.* Mr. Cota retains Ground Water of Vermont (GWV) to evaluate the site under the VT DEC Expressway process.
- *5 October 1995.* GWV conducts a soil-gas survey of the site (see Section 2.1) and collects ground-water, surface-water, and stream-sediment samples from the site for analysis of gasoline compounds (see Sections 2.2 - 2.5).
- *23 October 1995.* Ground Water of Vermont supervises the removal of both gasoline USTs from the site. A quarter-inch-diameter hole is observed beneath the fill pipe in one of the USTs, and deep pitting is observed in the other UST. Photoionization detector (PID) screening results of soils from the excavation indicate that soils from beneath the USTs and the pump island contain the highest levels of contamination. PID readings on soil samples from these areas exceed the PID's linear range of 2,000 parts per million (ppm).

## 2.0 INVESTIGATIVE PROCEDURES AND RESULTS

### 2.1 Soil-Gas Survey

A soil-gas survey of the site identified a soil-contaminant plume approximately 3,500 square feet in area and centered around the former USTs and pump island. Soil-gas sampling locations, PID readings and soil-gas contaminant contours are presented on Figure 3 in Appendix A.

The soil-gas survey was conducted on 5 October 1994. The objective of the soil-gas survey was to delineate the soil-contaminant plume at the site. Hollow steel rods were installed at 25 locations. Screened intervals on the rods were located approximately 2.0 to 2.5 feet below ground surface. Soil-gas samples collected from the probes were analyzed on site with a Thermo Environmental Model 580B PID, which was calibrated with isobutylene to a benzene reference.

### 2.2 Ground-Water Flow Direction and Gradient

On 5 October 1995, ground water in the surficial aquifer beneath the site was determined to be at depths of 9 to 10 feet below ground surface and flowing toward the southwest at an average gradient of 3.2% (Figure 4).

Water levels were measured in four of the six ground-water monitoring wells that have been installed at the site. The upgradient well (MW-6) could not be located at the time of sampling and is presumed to have been paved over or destroyed sometime since September 1990. Monitoring well MW-1 was dry.

The water-table elevation in each monitoring well was determined by subtracting the measured depth to water from a surveyed top-of-casing elevation. All elevations were measured relative to an arbitrary datum. Water-level measurements and elevation calculations are presented below in Table 1. Figure 4 presents a ground-water contour map prepared using this data.

TABLE 1. Ground-Water Elevations for 5 October 1995

| Well I.D. | Top of Casing Elevation | Depth to Water | Ground Water Table Elevation |
|-----------|-------------------------|----------------|------------------------------|
| MW-1      | 100.00                  | dry at 7.12    | < 92.88                      |
| MW-2      | 100.00                  | 9.09           | 90.91                        |
| MW-3      | 97.28                   | 9.15           | 88.13                        |
| MW-4      | 97.44                   | 8.64           | 88.80                        |
| MW-5      | 99.42                   | 8.59           | 90.83                        |

As discussed earlier in this report, saturated surficial materials at the site consist largely of coarse sand and gravel with cobbles. Such materials typically have hydraulic conductivities of between 90 and 9,000 feet per day and an effective porosity of approximately 0.2 (Domenico and Schwartz, 1990). As shown in the calculations below (from Fetter, 1994), these estimated values,



together with the average ground-water gradient of 3.2%, yield an estimated average ground-water flow velocity in the surficial aquifer of between 14.4 and 1,440 feet per day.

$$V_x = \frac{Kdh}{n_e dl} \text{ where } K = \text{hydraulic conductivity, } dh/dl = \text{ground-water gradient}$$

$$n_e = \text{effective porosity}$$

$$V_x = \frac{900 \text{ ft/day} * 0.032}{0.2} = 14.4 \text{ ft/day} \quad V_x = \frac{9,000 \text{ ft/day} * 0.032}{0.2} = 1,440 \text{ ft/day}$$

### 2.3 Ground-Water Quality Analyses

No records of ground-water sampling or analyses were available in VT DEC files. As discussed in Section 1.2, free-phase product was detected at various times from 1988 and 1989 in monitoring wells MW-3, MW-4 and MW-5. No product was detected in any of the monitoring wells between September 1989 and September 1990.

On 10 November 1994, ATC Environmental, Inc. collected ground-water samples from three on-site monitoring wells and submitted them for laboratory analysis of volatile organic compounds (VOCs) by EPA Method 8240. The analytical results, summarized below in Table 2, indicated that ground water in monitoring wells MW-4 and MW-5 exceeded one or more water-quality standards for gasoline compounds.

TABLE 2. Ground-Water Analytical Results for 10 November 1994

|              | MW-3      | MW-4         | MW-5          | VGES  | MCL    |
|--------------|-----------|--------------|---------------|-------|--------|
| Benzene      | ND        | <b>240</b>   | <b>5,580</b>  | 5     | 5      |
| Toluene      | 16.1      | <b>1,020</b> | <b>9,350</b>  | 2,420 | 1,000  |
| Ethylbenzene | 6.2       | <b>154</b>   | <b>1,120</b>  | 680   | 700    |
| Xylenes      | 52.7      | <b>2,080</b> | <b>5,320</b>  | 400   | 10,000 |
| Total BTEX   | <b>75</b> | <b>3,494</b> | <b>21,370</b> | -     | -      |
| MTBE         | BDL       | <b>195</b>   | <b>1,220</b>  | 40    | -      |

Notes: Results presented as µg/l, which is approximately equivalent to ppb.  
VGES - Vermont Groundwater Enforcement Standard  
MCL - Maximum Contaminant Level (State and Federal drinking-water standards)  
Values that exceed one or more water-quality standard are in bold.  
ND - None Detected  
BDL - Below Detection Limit

GWV collected ground-water samples from monitoring wells MW-2, 3, 4 and 5 on 5 October 1995. Free product was not detected in any of the monitoring wells. The analytical results (see Table 3) indicate that ground water in monitoring wells MW-3, 4 and 5 still exceeds water-quality standards for one or more gasoline compounds, and that monitoring well MW-5 continues to contain the highest contaminant concentrations. Contaminant concentrations in MW-3 are higher than in November 1994, while concentrations in MW-4 and MW-5 are lower for most compounds. Laboratory report forms are included in Appendix C.

TABLE 3. Ground-Water Analytical Results for 5 October 1995

|               | MW-2 | MW-3  | MW-4  | MW-5  | VGES  | MCL    |
|---------------|------|-------|-------|-------|-------|--------|
| Benzene       | 4.1  | 47.7  | 60.2  | 2,780 | 5     | 5      |
| Toluene       | 1.3  | 65.6  | 111   | 3,550 | 2,420 | 1,000  |
| Ethyl benzene | 1.1  | 74.8  | 80.9  | 461   | 680   | 700    |
| Xylenes       | 4.1  | 277   | 568   | 2,370 | 400   | 10,000 |
| Total BTEX    | 10.6 | 465.1 | 820.1 | 9,161 | -     | -      |
| MTBE          | 3.3  | 13.5  | 35.7  | 2,190 | 40    | -      |

The distribution of ground-water contaminants in October 1995 (Figure 5) suggests that the principal release source was in the vicinity of the former pump island, and that contaminants have migrated southwest to the Trout River, where they are discharging from the identified seep.

During the October 1995 sampling, each monitoring well was purged prior to sampling by bailing at least three standing volumes of water with a new pre-cleaned polyethylene bailer. Each bailer used for purging and sampling was suspended in the well casing for future dedicated use in that well. Well recharge rates were low in all of the wells. The water samples were submitted to an analytical laboratory for analysis by EPA Method 8020 of regulated gasoline compounds (benzene, toluene, ethylbenzene, and xylenes, collectively referred to as "BTEX" compounds) and for the gasoline additive methyl-tertiary butyl ether (MTBE).

Trip blank and duplicate samples were also collected and analyzed for the gasoline compounds described above to ensure that adequate quality assurance/quality control (QA/QC) standards were maintained. No gasoline compounds were detected in the trip blank. Analytical results of the MW-2 duplicate were within ten percent of those reported for the MW-2 sample.

## 2.4 Surface-Water Analyses

On 19 October 1988, the VT DEC collected surface-water samples from three locations in the Trout River. Analytical results, summarized in Table 4, indicate that benzene concentrations at two locations in the stream exceeded Vermont water-quality standards.

TABLE 4. Surface-Water Analytical Results for 19 October 1988

|              | E.J.'s Up | E.J.'s Mid | E.J.'s Down | VGES  | MCL    |
|--------------|-----------|------------|-------------|-------|--------|
| Benzene      | ND        | 210        | 14          | 5     | 5      |
| Toluene      | ND        | 400        | 20          | 2,420 | 1,000  |
| Ethylbenzene | ND        | 40         | 2           | 680   | 700    |
| Xylenes      | ND        | 280        | 13          | 400   | 10,000 |
| Total BTEX   | ND        | 930        | 49          | -     | -      |

On 10 November 1994, ATC Environmental, Inc. collected a surface-water sample from the petroleum seep in the Trout River. The analytical results, summarized below in Table 5, indicated that surface water in the Trout River continued to exceed Vermont water-quality standards for benzene, and now also exceeded the standards for toluene and MTBE (which was not an analyte in 1988). Assuming that the November 1994 surface-water sample was collected from the same location as the October 1988 sample, overall contaminant concentrations at the seep location appear to have increased over that period.

TABLE 5. Surface-Water Analytical Results for 10 November 1994

|              | Trout River | VGES  | MCL    |
|--------------|-------------|-------|--------|
| Benzene      | 190         | 5     | 5      |
| Toluene      | 1,750       | 2,420 | 1,000  |
| Ethylbenzene | 652         | 680   | 700    |
| Xylenes      | 4,540       | 400   | 10,000 |
| Total BTEX   | 7,132       | -     | -      |
| MTBE         | 172         | 40    |        |

On 5 October 1995, GWV collected surface-water samples from three locations along the Trout River. The sample labeled "Mid-Gradient" was collected from the petroleum seep. The upgradient and downgradient samples were collected from points along the same side of the bank approximately 50 feet upstream and 50 feet downstream of the seep, respectively. The analytical results, presented in Appendix C and summarized below in Table 6, indicate that benzene concentrations at the seep continue to exceed water-quality standards, but that overall contaminant concentrations are lower than those in November 1994. It should be noted that comparisons of surface-water analytical results over time may not be valid, because sampling locations and techniques may vary and changes in stream flow can strongly affect surface-water contaminant concentrations.

TABLE 6. Surface-Water Analytical Results for 5 October 1995

|               | Trout River Seep | Trout River Up gradient | Trout River Down gradient | VGES  | MCL    |
|---------------|------------------|-------------------------|---------------------------|-------|--------|
| Benzene       | 19.6             | ND <1                   | ND <1                     | 5     | 5      |
| Toluene       | 54.1             | ND <1                   | ND <1                     | 2,420 | 1,000  |
| Ethyl benzene | 35.8             | ND <1                   | ND <1                     | 680   | 700    |
| Xylenes       | 227              | ND <1                   | ND <1                     | 400   | 10,000 |
| Total BTEX    | 336.5            | ND                      | ND                        | -     | -      |
| MTBE          | 10               | ND <1                   | ND <1                     | 40    |        |

Note: ND <1 = None Detected at Detection Limit of 1 ppb

## 2.5 Stream-Sediment Analyses

On 5 October 1995, GWV collected samples of stream sediment from locations along the Trout River adjacent to the surface-water samples. The analytical results, presented in Appendix C and summarized below in Table 7, indicate that stream sediments at all of the sampling locations contain gasoline constituents, and that the highest concentrations are in sediments beneath the seep area.

TABLE 7. Stream-Sediment Analytical Results - 5 October 1995

|               | Trout River<br>Downgradient<br>Sed. | Trout River<br>Midgradient<br>Sed. | Trout River<br>Upgradient<br>Sed. |
|---------------|-------------------------------------|------------------------------------|-----------------------------------|
| Benzene       | ND <20                              | ND <500                            | ND <20                            |
| Toluene       | ND <20                              | 4,020                              | ND <20                            |
| Ethyl benzene | ND <20                              | 4,120                              | ND <20                            |
| Xylenes       | 33.1                                | 16,100                             | 35.7                              |
| Total BTEX    | 33.1                                | 24,240                             | 35.7                              |
| MTBE          | ND <20                              | ND <500                            | ND <20                            |

### **3.0 RECEPTOR SURVEY AND RISK ASSESSMENT**

GWV conducted a survey to identify potentially impacted sensitive receptors near the site. Identified sensitive receptors include the Trout River and indoor air at Cota's Deli And Beverage. Analytical results indicate that the Trout River is being impacted by contamination from the site. Because the store is constructed on a concrete slab and lacks a basement, it is considered unlikely that indoor air will be impacted.

#### **3.1 Trout River**

Gasoline odors, sheens and/or evidence of increased bacterial activity have been reported along the north bank of the Trout River near the site since 1988. As shown on Figure 4, the petroleum seep is located approximately 120 feet south and downgradient of the former USTs and pump island.

The Trout-River petroleum seep was visible during the GWV site visit on 5 October 1995. Gasoline odors that appeared to originate from the seep were detected in the lawn area behind the store. PID readings of 0.7 to 2.1 ppm were recorded in the breathing zone above the lawn at a location near the edge of the stream bank.

The residual gasoline contamination in soils in the vicinity of the former USTs and pump island represents a continuing source of contamination to the Trout River. If the contamination in this area is not remediated, gasoline will likely continue to leach into the underlying ground water and seep into the Trout River for several years.

#### **3.2 Indoor Air**

The building that houses Cota's Deli And Beverage is located approximately 20 feet south of the former pump island and less than 10 feet south of the former USTs. The building is constructed on a concrete slab and does not have a basement. No odors were detected in the building during a GWV site visit on 5 October 1995.

The slab construction of the on-site building and absence of any documented vapor impacts in the seven years since the release was first detected suggest that the risk to indoor air in the building is low.

#### 4.0 CONCLUSIONS

On the basis of the above-described investigation, Ground Water of Vermont has concluded the following:

1. A seep of free-phase gasoline product was reported in 1988 along the Trout River near the site. An investigation conducted by the VT DEC revealed that approximately one quart of gasoline was being released from the piping system every time the pump was activated. Free product was detected in three of six ground-water monitoring wells installed at the site, and persisted through September 1989. The VT DEC placed the site on the Inactive Hazardous Waste Sites List in October 1990.
2. The VT DEC returned the site to the Active Hazardous Waste Sites List in January 1995, after a Phase II Environmental Site Assessment of the property indicated that dissolved contamination was present in ground water and in the Trout River at levels above Vermont water-quality standards.
3. The two gasoline underground storage tank (UST) systems at the site were removed and replaced in October 1995. The bottom of one of the removed USTs had a quarter-inch-diameter hole, and the other was heavily pitted. Photoionization detector (PID) screening of soils beneath the USTs and the pump island revealed volatile-organic-compound (VOC) concentrations exceeding 2,000 parts per million (ppm).
4. Soil-gas survey results suggest that residual soil contamination is predominantly located in an area of approximately 3,500 square feet around the former USTs and pump island. Soils at the site consist of approximately seven to twelve feet of coarse sand-and-gravel stream deposits above bedrock.
5. Ground-water contamination extends southwest from the release locations to the Trout River. During a sampling event conducted on 5 October 1995, gasoline compound concentrations exceeded Vermont water-quality standards in three of four sampled monitoring wells. The water table was observed at depths of nine to ten feet below ground surface. The average ground-water gradient beneath the site is estimated to be 3.2%. Expected ground-water flow velocities in the surficial aquifer range from 90 to 9,000 feet per day.
6. The gasoline releases have also impacted the nearby Trout River. Gasoline odors, sheens, and/or evidence of increased biological activity have been observed periodically since 1988 in a seep located along the north bank of the Trout River at a point approximately 120 feet south of the former USTs and pump island. Benzene concentrations in surface-water samples collected from the seep in 1988, 1994 and 1995 exceeded Vermont water-quality standards.
7. Unless corrective action is undertaken, gasoline adsorbed to soils in the source area will likely continue to leach into ground water and discharge to the Trout River.

## 5.0 RECOMMENDATIONS

On the basis of the findings reached during this investigation, Ground Water of Vermont makes the following recommendations:

1. The documented impacts to the Trout River over the past eight years indicate that corrective action should be undertaken to remediate the soil and ground-water contamination. The coarse nature of the surficial materials and the thin layer of saturated materials above bedrock suggest that soil-vapor extraction will be the most cost-effective method to remove the bulk of residual contaminant mass from the site.
2. A pilot study should be conducted at the site to evaluate the potential effectiveness of soil-vapor extraction. The pilot-test results should be used to develop a Corrective Action Plan for the site.
3. Ground-water and surface-water quality at the site should be monitored monthly. All of the monitoring wells at the site should be sampled and analyzed for gasoline compounds. Surface-water samples should be collected from the Trout River at the seep and at a downgradient location.

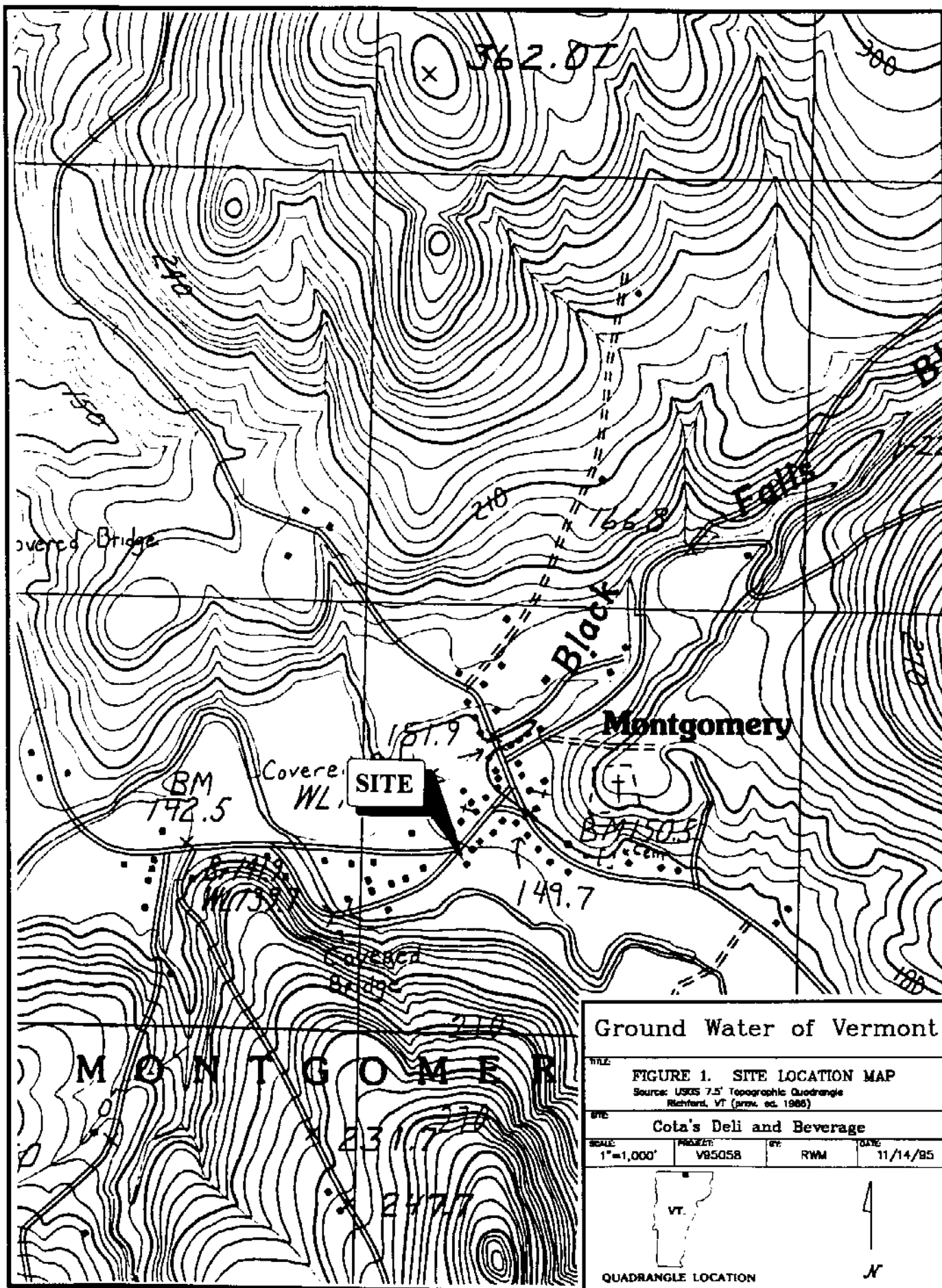
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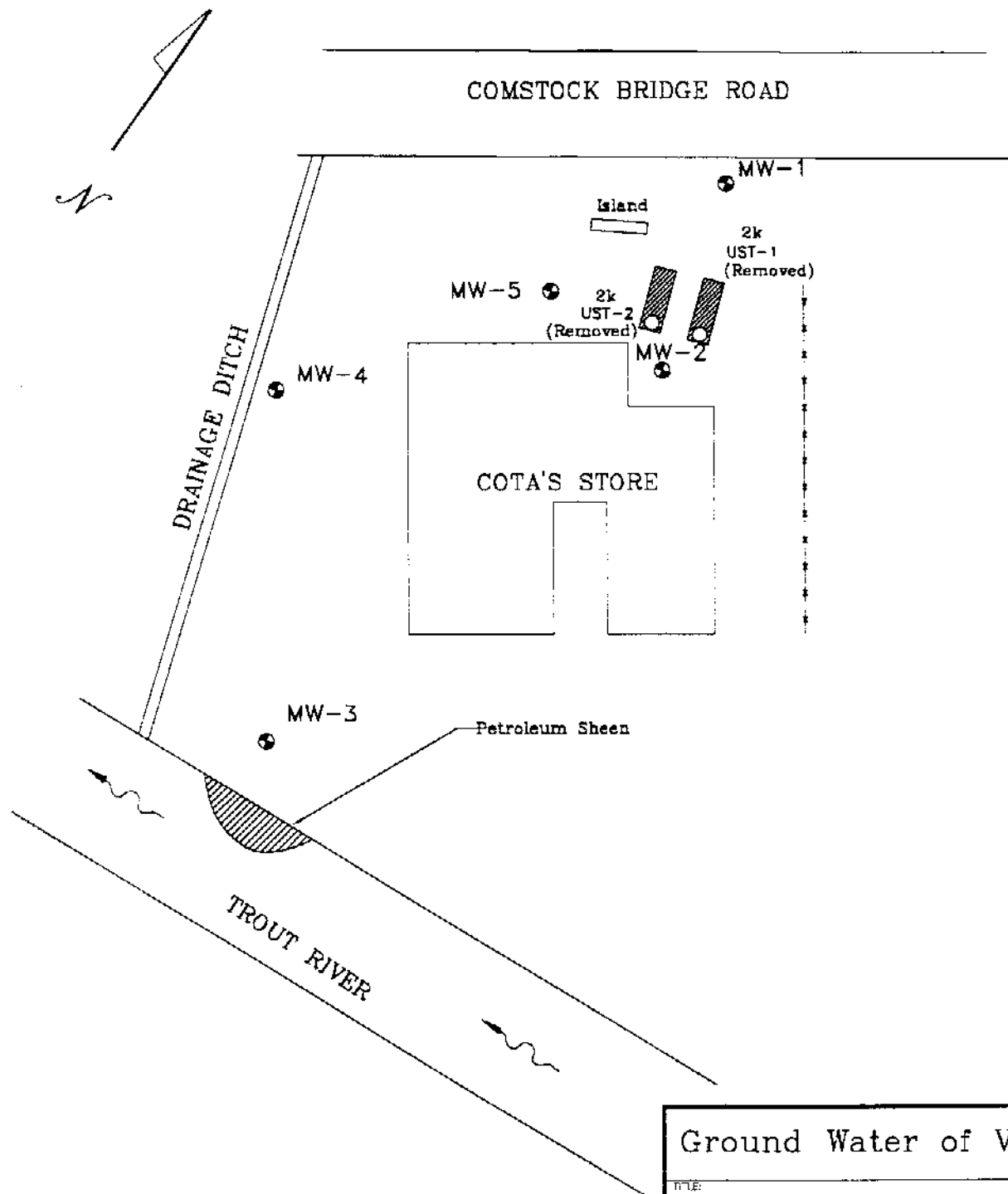
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- Stewart, D.P. and P. MacClintock, 1970. *Surficial Geologic Map of Vermont*, Office of the State Geologist.



## **APPENDIX A**

### **Figures**





# Ground Water of Vermont

TITLE:

FIGURE 2. SITE MAP

SITE:

COTA'S STORE- MONTGOMERY, VT

SCALE:

1" = 30'

PROJECT:

V95-058

BY:

BWH

DATE:

10/27/95

EXPLANATION

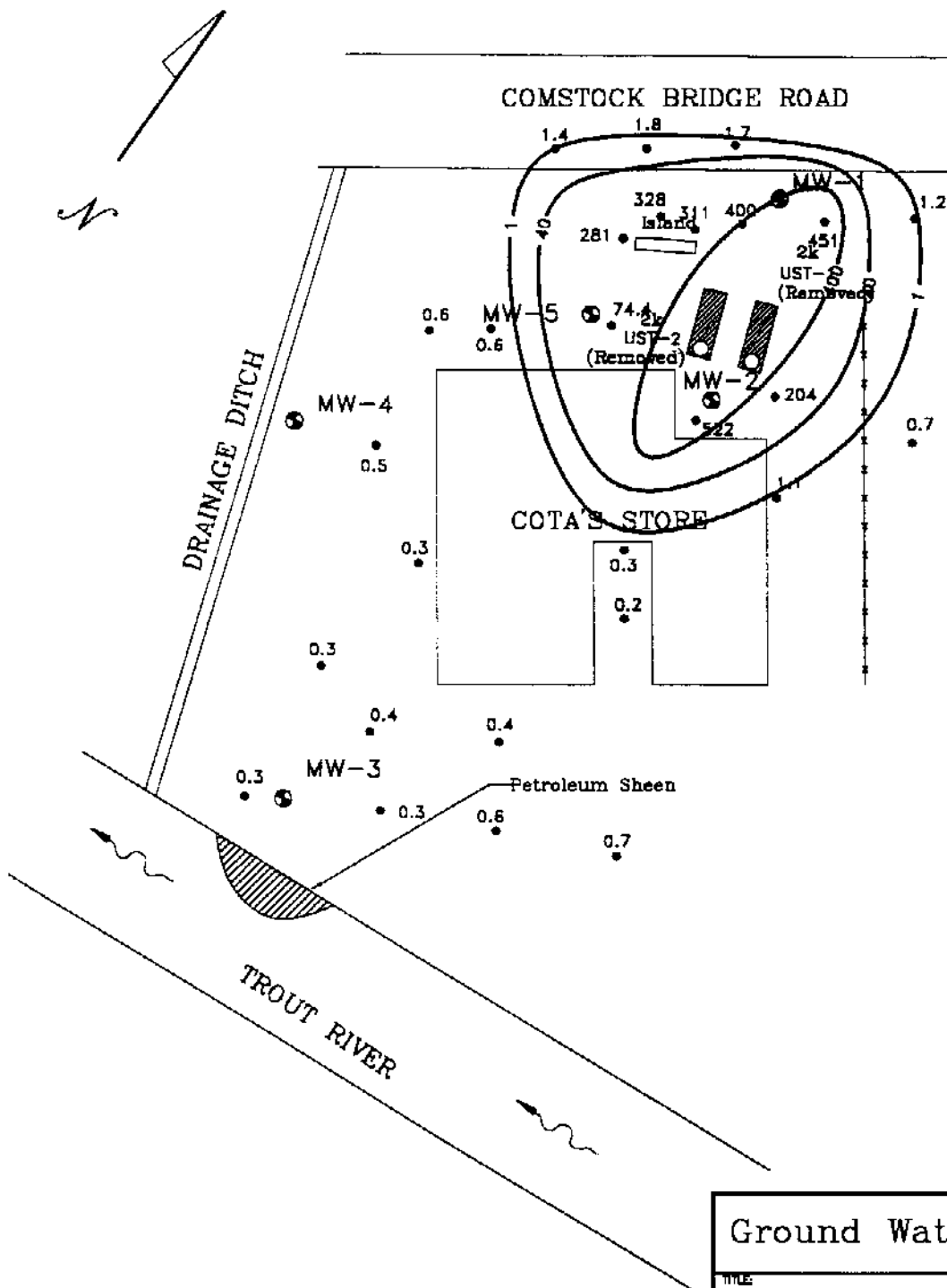


Monitoring Well



UST Fill Pipe

All Locations are Approximate



## Ground Water of Vermont

TITLE

FIGURE 3. SOIL GAS DISTRIBUTION MAP

Monitoring Dates: 5 October 1995

SITE

COTA'S STORE- MONTGOMERY, VT

SCALE:  
1" = 30'

PROJECT:  
V95-058

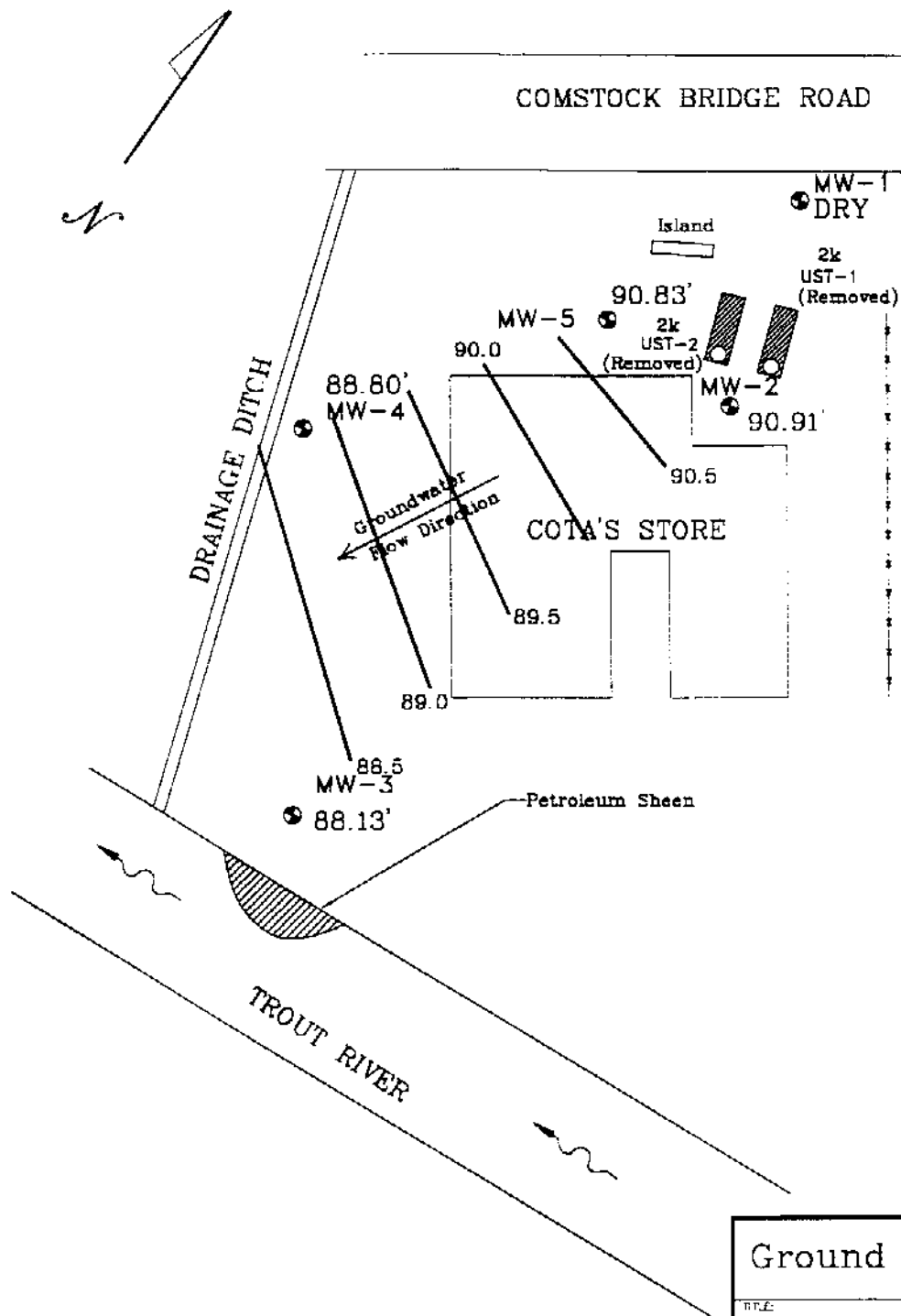
BY:  
BWH

DATE:  
10/27/95

EXPLANATION

- Soil Vapor Probe
- ⊕ Monitoring Well
- UST Fill Pipe
- 100- Soil Vapor Contour

All Locations are Approximate



## Ground Water of Vermont

FIGURE

### FIGURE 4. GROUND WATER CONTOUR MAP

Monitoring Date: 5 October 1985

SITE

COTA'S STORE- MONTGOMERY, VT

SCALE:

1" = 30'

PROJECT:

V95-058

BY:

BWH

DATE:

10/27/95

EXPLANATION



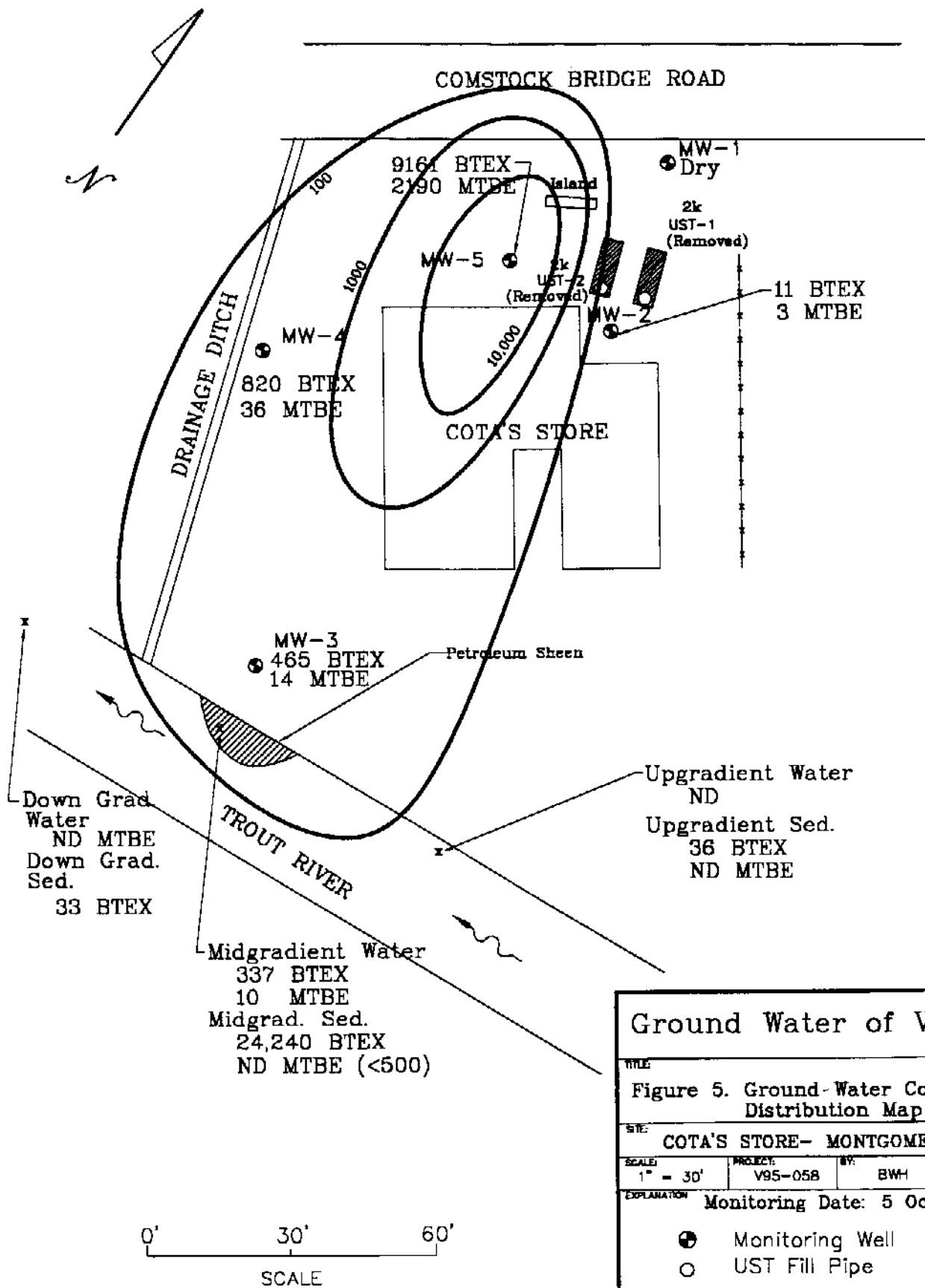
Monitoring Well



UST Fill Pipe

90.0 — Ground Water Contour

All Locations are Approximate



## Ground Water of Vermont

**Figure 5. Ground-Water Contaminant Distribution Map**

**SITE: COTA'S STORE- MONTGOMERY, VT**

**SCALE: 1" = 30'** **PROJECT: V95-058** **BY: BWH** **DATE: 10/27/95**

**EXPLANATION: Monitoring Date: 5 October 1995**

- Monitoring Well
- UST Fill Pipe
- 636 BTEX Concentration, ppb
- 100 — BTEX + MTBE Contour Line
- All Locations are Approximate

## **APPENDIX B**

### **Soil Boring Logs (1988)**

ADAMS ENGINEERING  
Gerard Adams  
RD #1, Box #3700  
Underhill, Vt. 05489  
899-4945  
Fed. ID 03-0296943

~~4~~October 28, 1988

Mr. Chuck Schwer  
Agency of Natural Resources.

The following are the boring logs for The E.J. Minimart/Montgomery project conducted under tour direction:

~~10/25/88~~ ~~Well #1~~ Near Town Rd. Drilled with 4.25" hollow stem augers.

-0.2' Top of well.  
-0.7' Top of bentonite.  
-1' Bottom of ", Top of sand pack, 5 50# bags .49 mm pool filter sand typ.  
-3.1' Top of well screen, 2" X .020" slot (typ.) X 4.5'\*  
4.4-6.4' 2,3,2,2. (blows from a #140 hammer falling 30" to drive a 2" standard penetration sampler 6" -blow counts are not intended for load bearing information, ie; emphasis is on sample recovery), Gray silty sand, smells of gas.  
-7.5' Bottom of well\*.  
-8.0' Auger refusal, bottom of sand pack.  
-8.2' Sampler refusal.

~~10/27/88~~ Well #2 dry.

~~Well #2~~ Door to store.

-0.2' Top of well.  
-1' Top of bentonite pellets.  
-2.0' Top of sand pack 6 bags, bottom of ".  
-4.1' Top well screen\*.  
5.1-7.1' 1,4,5,4. Gray fine sandy silt over gravel, smells of gas.  
-10.1' Sampler refusal, Gravel, nasty drilling.  
-11.1' Bottom of well\*, & sand pack.  
-11.3' Auger refusal.  
-11.5' Sampler refusal.

~~Well #3~~ Next to river. Completed ~~10/26/88~~

4.4-6.4' 4,14,28,40. Rusty gravel.  
-7.7' Abandoned auger drilling.

Pilot drilled with 3.875" tricone, & 4" flush casing advanced by driving, no samples cuttings all multi colored rock chips & some round gravel. Bedrock not definitive as large easily cut fractures were encountered typ. of #3-5.

-0.2' Top of well.  
-1' Top of bentonite.  
-2' Top of sand pack 3 bags, bottom of bentonite.  
-3.3' ~~Top of screen\*.~~  
-10' Solid rock.

~~10/24/88~~ ~~Water~~ ~~10/26/88~~

-12.3' Bottom of screen\*, sand pack & boring.

~~Well #4~~ Next to ditch.



-.2' Top of well.  
 Sand & rock fill.  
 -1' Top of bentonite.  
 -2' Top sand pack 5 bags, bottom of".  
 -4.7' Top of well screen 2" X .020" X 10'.  
 -9.2' Top of solid rock.  
 -14.2' Bottom of screen.  
 -14.6' Bottom of boring, well, & sand pack.  
 MW #5 NAPA Sign.  
 -.2' Top of well.  
 -1' Top of bentonite.  
 -3' Bottom of ", top of sand pack 3 bags.  
 -5.1' Top of well screen\*.  
 -13.1' Bottom of screen, sand pack, & boring\*.  
 10/27/88 #6 At fork in roads.  
 -.2' Top of well.  
 -1' Top of bentonite.  
 -3.3' Bottom of ", top of sand pack 4 bags.  
 -5.3' Top of well screen 2" X .020" X 10'.  
 -7+-' Approx. water.  
 -12' Top of silty soil.  
 -14.8' Bottom of well screen.  
 -15.3' Bottom of boring, sand pack, & well.

\* Solid section at bottom of screen cut off & replaced with slotted cap.

Developed by flushing-no return, all wells, MW #3 & #4 air pumped also: clean good recovery.

Protective curb box installed all wells.

Gerard Adams

*Gerard Adams*

Well Number MW 1

Location 11-1900-00 Project Number \_\_\_\_\_

Date Drilled 10/25/87 Total Depth of Hole 7.5' Diameter 2"

Surface Elevation \_\_\_\_\_ Water Level, Initial Dry 24-hrs

Screen: Dia. 2" Length 4.5' Slot Size .02"

Casing: Dia. \_\_\_\_\_ Length \_\_\_\_\_ Type \_\_\_\_\_

Drilling Company Adams Drilling Method Hollow Stem

Driller Corn Adams Log by \_\_\_\_\_

### Sketch Map

EJ'S



• *and*

## Notes

| Depth (Feet) | Well Construction | Notes        | Sample Number | Graphic Log | Description/Soil Classification<br>(Color, Texture, Structures)                                    |
|--------------|-------------------|--------------|---------------|-------------|--|
| 2.5'         |                   |              |               | 0           | Fine brown silts at 0-6'. H <sub>2</sub> O<br>READING AT 0-4' = 220 ppm, and<br>at 4-6' = 200 ppm. |
| 7.5'         |                   |              |               | 6           | coarse sands, gravel and cobbles   |
|              |                   | well<br>dry. |               | 7.5<br>50   | possibly bedrock refusal at 8.0'   |

Well Number MW2

## Drilling Log

Project EJ's Mini Mart Owner Mr. Ed ShupeLocation Martinsburg Project Number \_\_\_\_\_Date Drilled 10/25/88 Total Depth of Hole 11.1' Diameter 2"Surface Elevation - Water Level, Initial 29.0' 24-hrs. \_\_\_\_\_Screen: Dia. 2" Length 7' Slot Size .02"

Casing: Dia. \_\_\_\_\_ Length \_\_\_\_\_ Type \_\_\_\_\_

Drilling Company Adams Engineering Drilling Method Hollow StemDriller Gerry Adams Log by \_\_\_\_\_

Sketch Map



Notes

| Depth (Feet) | Well Construction | Notes | Sample Number | Graphic Log | Description/Soil Classification<br>(Color, Texture, Structures)     |
|--------------|-------------------|-------|---------------|-------------|---|
| 0.0          |                   |       |               |             |   |
| 2.0          |                   |       |               |             | Course backfill and topsoil   |
| 4.0          |                   |       |               |             | Fine brown silt. HNU reading at 2-4' = 110 ppm PDS (from hole).     |
| 7.0          |                   |       |               |             | Fine brown silt. HNU reading at 4-7' = 10 ppm PDS (removal sample). |
| 9.0          |                   |       |               |             | Fine silt and gravel with large pebbles. 300 ppm (from hole).       |
| 11.0         |                   |       |               |             |   |

Well Number MW3

## Drilling Log

Project EJ's Mini MART Owner Mr. Ed ShupeLocation Montgomery Project Number \_\_\_\_\_Date Drilled 10/26/88 Total Depth of Hole \_\_\_\_\_ Diameter 2"Surface Elevation \_\_\_\_\_ Water Level, Initial 10.4' 24-hrs \_\_\_\_\_Screen: Dia. 2" Length 12' Slot Size .02"Casing: Dia. 4" Length \_\_\_\_\_ Type \_\_\_\_\_Drilling Company Adams Engineering Drilling Method Rockbit and CasingDriller Gerry Adams Log by \_\_\_\_\_Sketch Map See sketch  
• MW3

EJ's

Notes

| Depth (Feet) | Well Construction | Notes | Sample Number | Graphic Log | Description/Soil Classification<br>(Color, Texture, Structures)  |
|--------------|-------------------|-------|---------------|-------------|--|
| 3.3'         |                   |       |               |             | Split spoon soil sampling not possible w/ Rockbit casing method. |
| 12'          |                   |       |               |             | Drilled through solid rock at 10'.                               |

Well Number 11134

Location Montgomery Project Number                     

Date Drilled 10/26/68 Total Depth of Hole 14.6' Diameter 2"

Surface Elevation ----- Water Level, Initial ----- 24-hrs. -----

Screen: Dia 2" Length 10' Slot Size .02"

Casing: Dia 4" Length            Type           

Drilling Company Adams Eng. Drilling Method Rock bit and casing

Driller Gregory Adams Log by \_\_\_\_\_

### Sketch Map



224

## Notes

| Depth (Feet) | Well Construction | Notes | Sample Number | Graphic Log | Description/Soil Classification<br>(Color, Texture, Structures)                   |
|--------------|-------------------|-------|---------------|-------------|---|
| 4.6          |                   |       |               |             | Drilled through rock at 5', and<br>9'. Steers dropped from<br>wire removed at 7'. |

# Drilling Log

Project EJ's Air Unit Well Number MWS  
 Location Montgomery Owner W. Edwards  
 Date Drilled 10/27/88 Project Number \_\_\_\_\_  
 Total Depth of Hole 13.1' Diameter 2"  
 Surface Elevation \_\_\_\_\_ Water Level, Initial \_\_\_\_\_ 24-hrs. \_\_\_\_\_  
 Screen: Dia. 2" Length 8' Slot Size .02"  
 Casing: Dia. 4" Length \_\_\_\_\_ Type \_\_\_\_\_  
 Drilling Company Adams Eng. Drilling Method Rockbit w/casing  
 Driller Gerry Adams Log by \_\_\_\_\_

## Sketch Map



## Notes

| Depth (Feet) | Well Construction | Notes | Sample Number | Graphic Log | Description/Soil Classification<br>(Color, Texture, Structures) |
|--------------|-------------------|-------|---------------|-------------|---|
| 5.1          |                   |       |               |             | <p>VERY strong petroleum odor<br/>and grease,</p>               |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
|              |                   |       |               |             |   |
| 13.1         |                   |       |               |             |   |

Well Number MW6

Order Gerry Adams Log by \_\_\_\_\_

ms. B. 1. 6

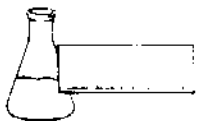
## Notes

No evidence of petroleum vapors or steams.

## **APPENDIX C**

### **Laboratory Report Forms**





**ENDYNE, INC.**

**Laboratory Services**

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**REPORT OF LABORATORY ANALYSIS**

OCT 10 1995

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,850 - 80,861

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated water sample preservation with HCl; soil samples were properly preserved.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

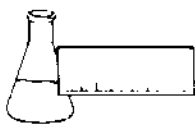
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



**ENDYNE, INC.**

**Laboratory Services**

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,853  
STATION: MW-2  
TIME SAMPLED: 11:30  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | 4.1                         |
| Chlorobenzene       | 1                             | ND <sup>1</sup>             |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | 1.1                         |
| Toluene             | 1                             | 1.3                         |
| Xylenes             | 1                             | 4.1                         |
| MTBE                | 1                             | 3.3                         |

Bromobenzene Surrogate Recovery: 95%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

**NOTES:**

1 None detected



**ENDYNE, INC.**

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FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,854  
STATION: MW-3  
TIME SAMPLED: 10:00  
SAMPLER: Brian Starer

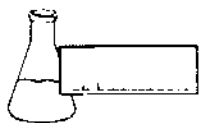
| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | 47.7                        |
| Chlorobenzene       | 1                             | ND <sup>1</sup>             |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | 74.8                        |
| Toluene             | 1                             | 65.6                        |
| Xylenes             | 1                             | 277.                        |
| MTBE                | 1                             | 13.5                        |

Bromobenzene Surrogate Recovery: 94%

NUMBER OF UNIDENTIFIED PEAKS FOUND: > 10

**NOTES:**

1 None detected



**ENDYNE, INC.**

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FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,852  
STATION: MW-4  
TIME SAMPLED: 9:30  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/L)<sup>1</sup></u> | <u>Concentration (ug/L)</u> |
|---------------------|---|-----------------------------|
| Benzene             | 10  | 60.2                        |
| Chlorobenzene       | 10  | ND <sup>2</sup>             |
| 1,2-Dichlorobenzene | 10  | ND                          |
| 1,3-Dichlorobenzene | 10  | ND                          |
| 1,4-Dichlorobenzene | 10  | ND                          |
| Ethylbenzene        | 10  | 80.9                        |
| Toluene             | 10  | 111.                        |
| Xylenes             | 10  | 568.                        |
| MTBE                | 10  | 35.7                        |

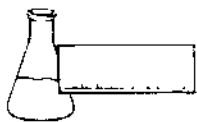
Bromobenzene Surrogate Recovery: 101%

NUMBER OF UNIDENTIFIED PEAKS FOUND: > 10

**NOTES:**

1 Detection limit raised due to high levels of contaminants. Sample run at 10% dilution.

2 None detected



**ENDYNE, INC.**

**Laboratory Services**

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FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,855  
STATION: MW-5  
TIME SAMPLED: 11:00  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/L)<sup>1</sup></u> | <u>Concentration (ug/L)</u> |
|---------------------|---|-----------------------------|
| Benzene             | 200                                       | 2,780.                      |
| Chlorobenzene       | 200                                       | ND <sup>2</sup>             |
| 1,2-Dichlorobenzene | 200                                       | ND                          |
| 1,3-Dichlorobenzene | 200                                       | ND                          |
| 1,4-Dichlorobenzene | 200                                       | ND                          |
| Ethylbenzene        | 200                                       | 461.                        |
| Toluene             | 200                                       | 3,550.                      |
| Xylenes             | 200                                       | 2,370.                      |
| MTBE                | 200                                       | 2,190.                      |

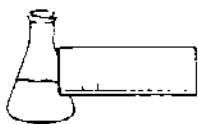
Bromobenzene Surrogate Recovery: 100%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

**NOTES:**

1 Detection limit raised due to high levels of contaminants. Sample run at 0.5% dilution.

2 None detected



**ENDYNE, INC.**

**Laboratory Services**

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Williston, Vermont 05495  
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FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,856  
STATION: Trout River Upgradient  
TIME SAMPLED: 11:40  
SAMPLER: Brian Starer

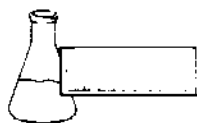
| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | ND <sup>1</sup>             |
| Chlorobenzene       | 1                             | ND                          |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | ND                          |
| Toluene             | 1                             | ND                          |
| Xylenes             | 1                             | ND                          |
| MTBE                | 1                             | ND                          |

Bromobenzene Surrogate Recovery: 98%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

**NOTES:**

1 None detected



**ENDYNE, INC.**

Laboratory Services

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,857  
STATION: Trout River Midgradient  
TIME SAMPLED: 12:30  
SAMPLER: Brian Starer

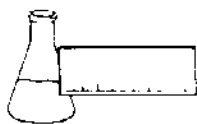
| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | 19.6                        |
| Chlorobenzene       | 1                             | ND <sup>1</sup>             |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | 35.8                        |
| Toluene             | 1                             | 54.1                        |
| Xylenes             | 1                             | 227.                        |
| MTBE                | 1                             | 10.0                        |

Bromobenzene Surrogate Recovery: 96%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 None detected



**ENDYNE, INC.**

**Laboratory Services**

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,858  
STATION: Trout River Downgradient  
TIME SAMPLED: 12:40  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | ND <sup>1</sup>             |
| Chlorobenzene       | 1                             | ND                          |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | ND                          |
| Toluene             | 1                             | ND                          |
| Xylenes             | 1                             | ND                          |
| MTBE                | 1                             | ND                          |

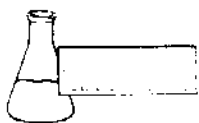
Bromobenzene Surrogate Recovery: 99%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

**NOTES:**

1 None detected





**ENDYNE, INC.**

**Laboratory Services**

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,859  
STATION: Trout River Upgradient Sed.  
TIME SAMPLED: 11:50  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/kg)</u> | <u>Concentration</u><br><u>(ug/kg. as received)</u> |
|---------------------|--------------------------------|---|
| Benzene             | 20                             | ND <sup>1</sup>                                     |
| Chlorobenzene       | 20                             | ND  |
| 1,2-Dichlorobenzene | 20                             | ND  |
| 1,3-Dichlorobenzene | 20                             | ND  |
| 1,4-Dichlorobenzene | 20                             | ND  |
| Ethylbenzene        | 20                             | ND  |
| Toluene             | 20                             | ND  |
| Xylenes             | 20                             | 35.7  |
| MTBE                | 20                             | ND  |

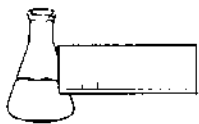
Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

PERCENT SOLIDS: 73%

NOTES:

1 None detected



**ENDYNE, INC.**

**Laboratory Services**

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,860  
STATION: Trout River Midgradient Sed.  
TIME SAMPLED: 12:10  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/kg)<sup>1</sup></u> | <u>Concentration</u><br><u>(ug/kg, as received)</u> |
|---------------------|--|---|
| Benzene             | 500  | ND <sup>2</sup>                                     |
| Chlorobenzene       | 500  | ND  |
| 1,2-Dichlorobenzene | 500  | ND  |
| 1,3-Dichlorobenzene | 500  | ND  |
| 1,4-Dichlorobenzene | 500  | ND  |
| Ethylbenzene        | 500  | 4,120.  |
| Toluene             | 500  | 4,020.  |
| Xylenes             | 500  | 16,100.   |
| MTBE                | 500  | ND  |

Bromobenzene Surrogate Recovery: 115%

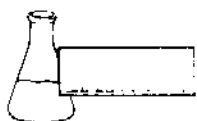
NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

PERCENT SOLIDS: 84%

**NOTES:**

1 Detection limit raised due to high levels of contaminants.

2 None detected



**ENDYNE, INC.**

**Laboratory Services**

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FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 12, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,861  
STATION: Trout River Downgradient Sed.  
TIME SAMPLED: 12:20  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/kg)</u> | <u>Concentration</u><br><u>(ug/kg, as received)</u> |
|---------------------|--------------------------------|---|
| Benzene             | 20                             | ND <sup>1</sup>                                     |
| Chlorobenzene       | 20                             | ND  |
| 1,2-Dichlorobenzene | 20                             | ND  |
| 1,3-Dichlorobenzene | 20                             | ND  |
| 1,4-Dichlorobenzene | 20                             | ND  |
| Ethylbenzene        | 20                             | ND  |
| Toluene             | 20                             | ND  |
| Xylenes             | 20                             | 33.1  |
| MTBE                | 20                             | ND  |

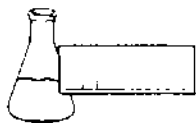
Bromobenzene Surrogate Recovery: 102%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

PERCENT SOLIDS: 82%

**NOTES:**

1 None detected



**ENDYNE, INC.**

**Laboratory Services**

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Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 11, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,851  
STATION: Duplicate (mw-2) *Pl*  
TIME SAMPLED: Not Indicated  
SAMPLER: Brian Starer

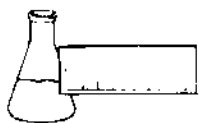
| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | 3.8                         |
| Chlorobenzene       | 1                             | ND <sup>1</sup>             |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | ND                          |
| Toluene             | 1                             | 1.1                         |
| Xylenes             | 1                             | 4.0                         |
| MTBE                | 1                             | 2.5                         |

Bromobenzene Surrogate Recovery: 94%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

**NOTES:**

1 None detected



**ENDYNE, INC.**

**Laboratory Services**

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Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: GroundWater of Vermont  
PROJECT NAME: Ken Cota General Store  
REPORT DATE: October 12, 1995  
DATE SAMPLED: October 5, 1995  
DATE RECEIVED: October 6, 1995  
DATE ANALYZED: October 11, 1995

PROJECT CODE: GWVT1500  
REF.#: 80,850  
STATION: Trip Blank  
TIME SAMPLED: 9:15  
SAMPLER: Brian Starer

| <u>Parameter</u>    | <u>Detection Limit (ug/L)</u> | <u>Concentration (ug/L)</u> |
|---------------------|-------------------------------|-----------------------------|
| Benzene             | 1                             | ND <sup>1</sup>             |
| Chlorobenzene       | 1                             | ND                          |
| 1,2-Dichlorobenzene | 1                             | ND                          |
| 1,3-Dichlorobenzene | 1                             | ND                          |
| 1,4-Dichlorobenzene | 1                             | ND                          |
| Ethylbenzene        | 1                             | ND                          |
| Toluene             | 1                             | ND                          |
| Xylenes             | 1                             | ND                          |
| MTBE                | 1                             | ND                          |

Bromobenzene Surrogate Recovery: 97%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

**NOTES:**

1 None detected



# GroundWater of Vermont

The Chace Mill, One Mill Street, Box C-5, Burlington, Vermont, 05401  
(802)-860-6065 (802)-860-6076 Fax

## CHAIN OF CUSTODY RECORD

LABORATORY

ANALYSIS STATUS:

☒ RUSH (2-DAY)  
☐ PRIORITY (4-DAY)  
☐ BEST AVAILABLE TIME

PROJECT NUMBER: V95-058  
PROJECT NAME: Ken Lake Groundwater Study  
PROJECT LOCATION: Montgomery, VT  
PROJECT MANAGER: Bob Miller  
COLLECTED BY: Brian Storer  
DATE: 10/5/95

ANALYSIS REQUESTED

METALS - PLEASE LIST: MA ( ) ER-TDX ( ) (R)  
CL & GREASE IR ( ) GRAY ( )  
VOLATILE ORGANICS: 624 ( ) 607 ( ) 602 ( )  
8010 ( ) 8015 ( ) 8020 & MTBE ( )  
EXTRACTABLES: ACOS ( ) B-H ( ) PCBs ( )  
PETS ( )  
TSS ( ) TDS ( ) PH ( ) SPEC COND ( )  
BACTERIAL: SPC ( ) TOT COU ( ) FEC COU ( )  
CYANIDE: AMEN ( ) TOT ( )  
CL ( ) F ( ) SOD ( )  
NO3 ( ) NO2 ( ) NH3 ( )  
TOLP: METALS ( ) VOLATILES ( ) PESTICIDES ( )  
SEMI-VOLATILES ( ) HERBICIDES ( )  
OTHER:  
OTHER:

PAGE 1 OF 1

1 week  
turn around  
per  
H. Laker  
MS

REMARKS

| SAMPLE ID                          | DATE | TIME | SAMPLE MATRIX | TYPE OF CONTAINER | # CONT. | PRESRVD | METALS | CL & GREASE | VOLATILES | EXTRACTABLES | TSS | BACTERIA | CYANIDE | CL ( ) | NO3 | TOLP | OTHER | OTHER | REMARKS |
|------------------------------------|------|------|---------------|-------------------|---------|---------|--------|-------------|-----------|--------------|-----|----------|---------|--------|-----|------|-------|-------|---------|
| Trip Blank                         | 10/4 | 915A | W             | VOA 80,850        | 2       | IIA     |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Duplicate                          |      |      |               | 80,854            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| MW-4                               |      | 930  |               | 80,850            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| MW-2                               |      | 1130 |               | 80,853            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| MW-3                               |      | 1000 |               | 80,858            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| MW-5                               |      | 1100 |               | 80,858            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Trout River up gradient            |      | 1140 |               | 80,856            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Trout River mid gradient           |      | 1230 |               | 80,857            |         |         |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Trout River down gradient          |      | 1240 | ✓             | 80,858            |         | ✓       |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Trout River up gradient sediment   |      | 1150 | S             | 80,859            |         | II      |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Trout River mid gradient sediment  |      | 1210 | S             | 80,860            |         | I       |        |             | X         |              |     |          |         |        |     |      |       |       |         |
| Trout River down gradient sediment | ✓    | 1220 | S             | 80,861            | ✓       | IV      |        |             | X         |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          |         |        |     |      |       |       |         |
|                                    |      |      |               |                   |         |         |        |             |           |              |     |          | </      |        |     |      |       |       |         |

### MATRIX

W = AQUEOUS  
S = SOLIDS

### PRESERVATIVE

I = ICED  
A = ACIDIFIED (1:1 HCl 4 drops)  
B = BASE  
N = SODIUM BISULFATE

### RELINQUISHED BY

B. D. Moore  
Bill Moore

### DATE

10/4/95

### TIME

11:00

### RECEIVED BY

Bob Beane